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IMAGES IN INTERVENTION

Radial Artery Graft String Sign Due to Lumen Obliteration by Neointima

Insight From Optical Coherence Tomography

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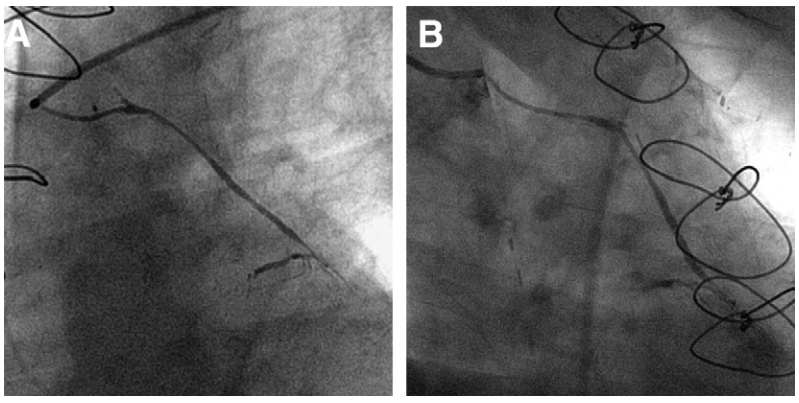

Figure 1. Angiographic Appearances of the Radial Artery Graft "String Sign"

Aortocoronary radial artery graft to the circumflex first obtuse marginal branch with angiographic appearances of the "string sign." Anteroposterior **(A)** and right lateral **(B)** projections. Although patent throughout its length, the lumen of the radial artery graft is almost completely abolished leaving only a thread demonstrable on contrast injection.

The radial artery is a commonly used conduit for coronary artery bypass grafting. Long-term patency rates are at least as good and in some series are better than for saphenous vein grafts (1,2). However, radial artery graft failure remains a significant problem (3), in particular in cases where radial conduits are used on smaller target vessels or where there is significant competitive flow from a native coronary with a relatively low grade stenosis (4). The string sign, where the radial graft conduit is patent but with only a thread of antegrade flow, is a well-recognized angiographic presentation of radial graft failure (3). We describe for the first time optical coherence tomography (OCT) images of a radial conduit presenting with the string sign.

A 62-year-old man presented electively for angiographic follow-up as part of the ART (Arterial Revascularization Trial) 3 years after 4-vessel coronary artery bypass grafting, including a radial artery graft to the principle obtuse marginal branch of the circumflex coronary artery. He was clinically well and without angina at the time of the study. Angiography demonstrated the radial graft string sign with minimal contrast penetration (Figs. 1A and 1B). OCT (M3, LightLab Imaging, Westford, Massachusetts) demonstrated a thick smooth neointima throughout the length of the radial graft almost obliterating the lumen and with no OCT features of atherosclerotic plaque formation or calcification (Figs. 2A, 2B, 2D, 2E, and 2G). The neointima formation in a saphenous vein graft

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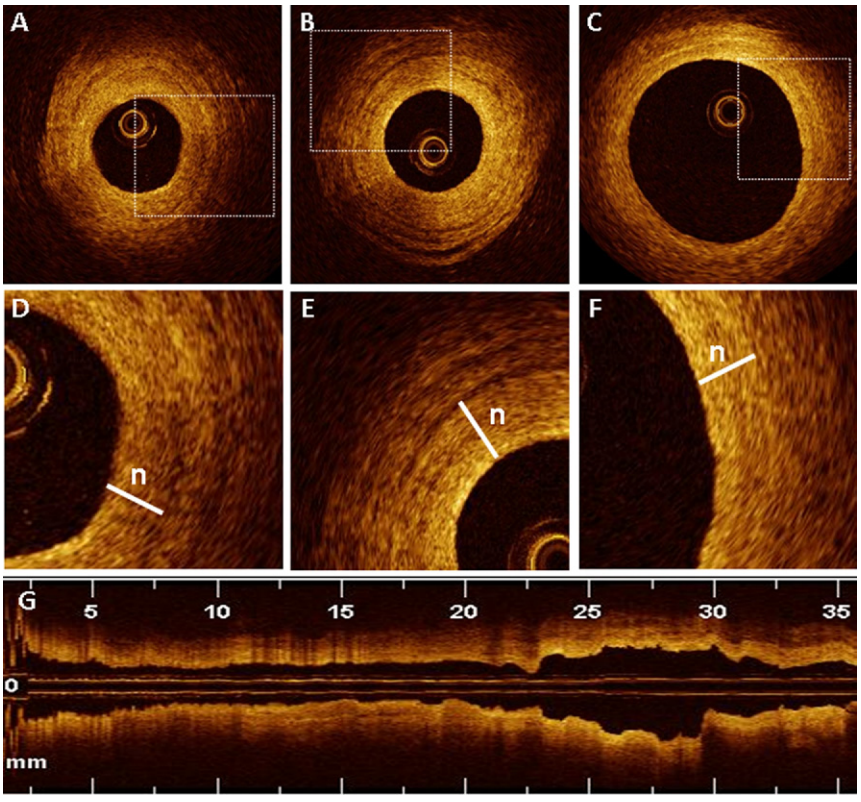

Figure 2. OCT Findings of Lumen Obliteration by Neointima

Optical coherence tomography (OCT) cross-sectional images **(A, B, D, and E)** and long axis **(G)** of the lumen and vessel wall of the radial conduit demonstrating marked concentric neointima formation (n) leading to severe reduction in luminal cross-sectional area. A typical OCT cross-sectional image of a saphenous vein graft from the same patient is shown for comparison **(C and F)**.

from the same patient is shown for comparison (Figs. 2C and 2F).

OCT imaging can provide novel insights into the mechanisms underlying coronary and graft conduit pathology. Although other mechanisms may be relevant in different patients, this case suggests the radial artery string sign may result from an exaggerated neointimal reaction in the radial graft leading to a severe reduction of luminal cross-sectional area.

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